Carleton University

Ontario Graduate Scholarship Research/Program Statement

Must not contain more than 3,950 characters (with spaces)

Name: Example 2 Student Number:

It is a central tenet of conservation biology that knowledge of a species' range is essential to adequately assess threats it faces, which can impact population trends. Conservation of migratory bird species is particularly challenging because they use a variety of habitats across large geographic areas throughout their annual cycle. Migratory species often cross geo-political borders, and their migratory routes, breeding range and over-wintering locations may vary across different sub-populations of the same species. Effective conservation of migratory birds therefore requires an understanding of space use throughout the annual cycle, and the degree to which this varies across breeding populations (1).

Bank swallow (Riparia riparia, hereafter BANS) populations in Canada have declined by up to 98% since 1970 (2). The species was designated Threatened by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), although breeding population trends vary regionally (2). Research on threats faced by BANS on their Canadian breeding grounds has not identified causes of decline, but evidence suggests that factors acting over the non-breeding period may limit BANS populations (3, 4). Understanding the migratory routes and over-wintering locations of BANS that breed in different parts of Canada can help identify which threats they may face outside of the breeding grounds.

My research aims to describe BANS migration routes and overwintering locations to facilitate conservation of the species (2). I will test the hypothesis that variation in regional breeding population trends is the result of BANS from each region adopting different migration routes and spending the winter in different geographies, exposing breeding populations to different threats.

To address possible variation in migration routes, I will use radio-transmitters to track the migration of 300 BANS individuals using the Motus automated radio-telemetry network, which spans North, Central and South America (5). Tagged individuals are detected when they pass within 15-30 km of an antenna station, allowing me to quantify their migration routes and timing.

To quantify potential variation in wintering locations, I will perform stable isotope analysis on 300 BANS tail feathers sampled from across Canada and Alaska. Ratios of heavy isotopes to their lighter counterparts vary across landscapes due to biogeochemical processes like climate, precipitation, and photosynthesis (6). BANS molt and regrow their tail feathers on their wintering grounds (7), so the isotopic signatures of the feathers reveal each individual's overwintering area. By comparing the isotopic ratios of three elements (H2/H1, C13/C12 and S34/S32) to modeled patterns of isotopic variance across Central and South America, I will assign individuals to broad-scale probable overwintering locations (6).

My prior experience handling and banding birds, collecting and analyzing data, and writing scientific papers and reports has prepared me well for this project. Carleton University is an ideal research environment for my M.Sc. because my co-supervisors [redacted] both have extensive experience researching species at risk and movement ecology. Finally, this project is support by partners across 12 provinces and territories, including Environment and Climate Change Canada, Birds Canada, the University of New Brunswick, and Acadia University.

1. Marra et al. 2011. Environ. Law, 317-354
2. COSEWIC. 2013. https://species-registry.canada.ca/index-en.html#/species/1233-894#cosewic_status_reports
3. Imlay et al. 2018. Ecosphere, e02166
4. Imlay et al. 2021. Anim. Behav., 207-214
5. Taylor et al. 2017. Avian Conserv. Ecol., 8
6. García-Pérez & Hobson. 2014. Ecosphere, 21
7. Imlay et al. 2017. J. Field Ornithol. 405-415.